

CRIME SCENE DO NOT CROSS

FINGERPRINTING UNIT

BABY BLUES

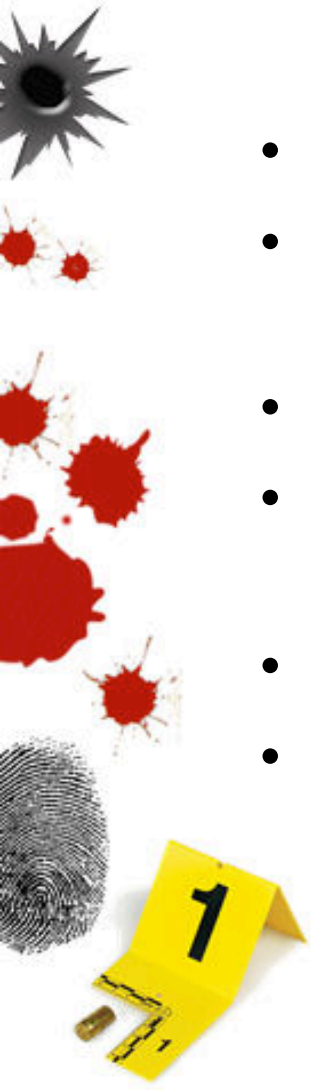


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FINGERPRINTS

By the end of this unit you will be able to:

- discuss the history of fingerprinting
- describe the characteristics of fingerprints and fingerprinting minutiae
- explain when and how fingerprints are formed
- describe what causes fingerprints to be left on objects
- identify the basic types of fingerprints
- describe how criminals attempt to alter their fingerprints



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FINGERPRINTS

By the end of this unit you will be able to:

- determine the reliability of fingerprints as a means of identification
- describe the Integrated Automated Fingerprint Identification System (IAFIS)
- explain how fingerprint evidence is collected
- describe the latest identification technologies
- determine if a fingerprint matches a fingerprint on record
- use the process of lifting a latent print



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DACTYLOSCOPY

- Dactyloscopy is the study of fingerprints.
- Dactylograms are the fingerprints themselves.



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HISTORY OF FINGERPRINTING

Sir William Herschel – 1856

- Maybe the first to use fingerprints
- He was an English Chief Magistrate in India who used fingerprints from Indian workers on official contracts



KONAI's HANDPRINT
from the back of the contract
Bengal, India, 1858

Handwritten text in a script, likely Bengali, from the back of a contract.

Handwritten text in a script, likely Bengali, from the back of a contract.

Contract for 2,000 mounds (195,200 lbs.) of lead-metalling
between W.J. Herschel and Rajadhar Konai, in Konai's handwriting



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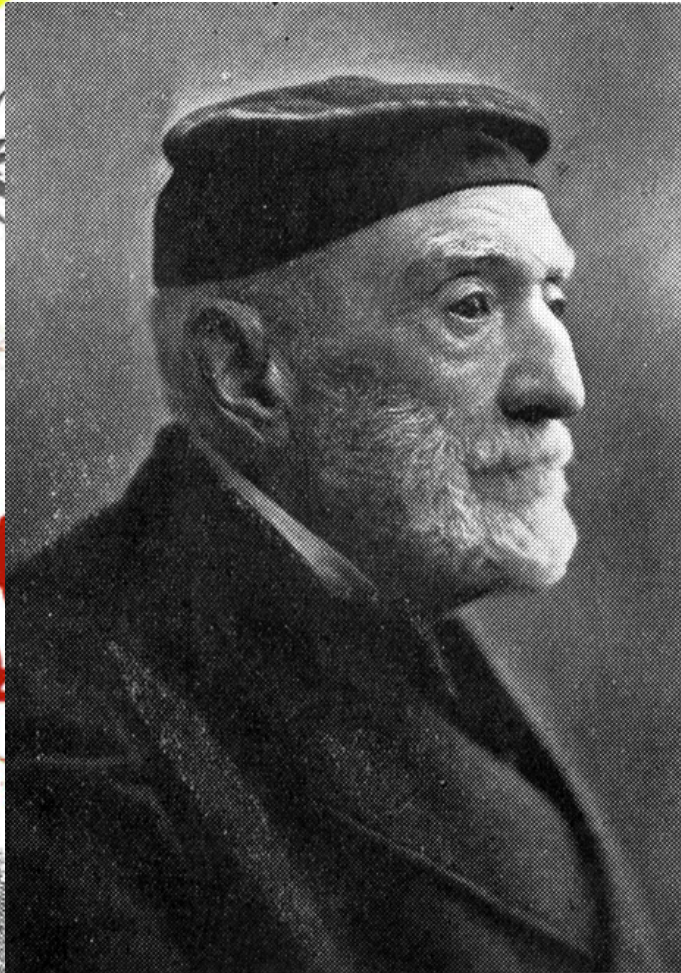
HISTORY OF FINGERPRINTING

Dr. Henry Faulds

Noticed fingerprints on prehistoric pottery



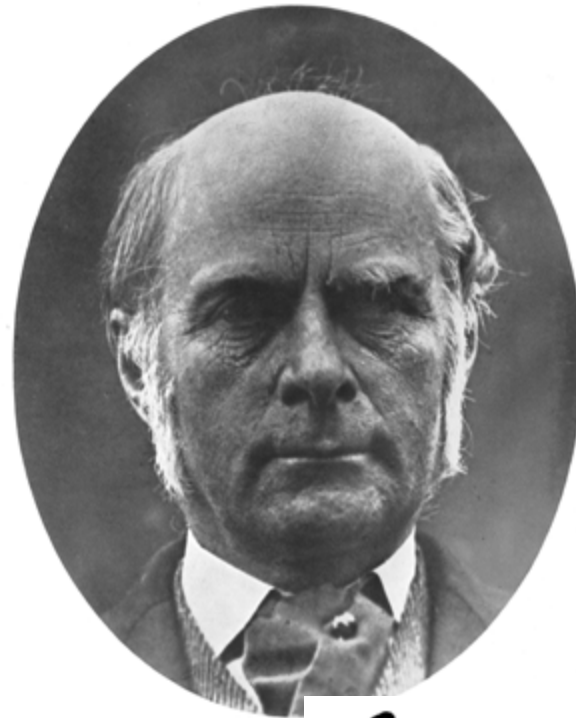
Published an article in the magazine “Nature” saying fingerprints could be used for identification



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HISTORY OF FINGERPRINTING

Sir Francis Galton - 1888



Francis Galton



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HISTORY OF FINGERPRINTING

Sir Francis Galton - 1888

- Sir Francis Galton, a British anthropologist and a cousin of Charles Darwin, began his observations of fingerprints as a means of identification in the 1880's.
- In 1892, he published his book, "Fingerprints", establishing the individuality and permanence of fingerprints. The book included the first classification system for fingerprints.



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WHAT ARE FINGERPRINTS?

- Fingerprints are impressions left on any surface that consists of patterns made by the ridges on a finger
 - Ridge: appears dark in an images
 - Valley: appears light in an image
- All fingers, toes, feet, and palms are covered in small ridges.



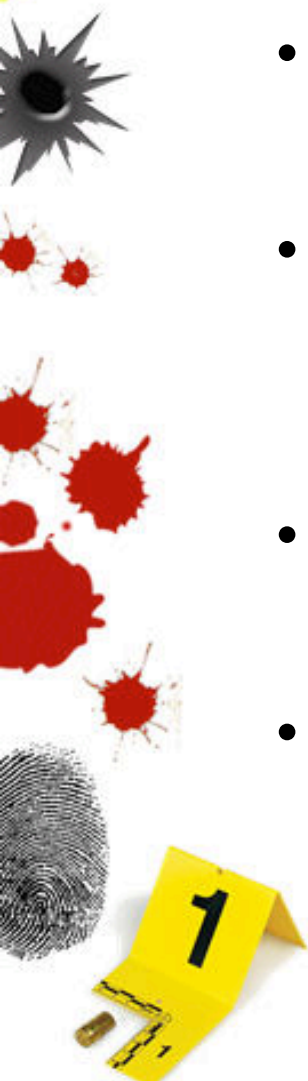
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WHAT ARE FINGERPRINTS?

- These ridges are called *dermal* or *friction*, *ridges*.
- These ridges help us get or keep our grip on objects.

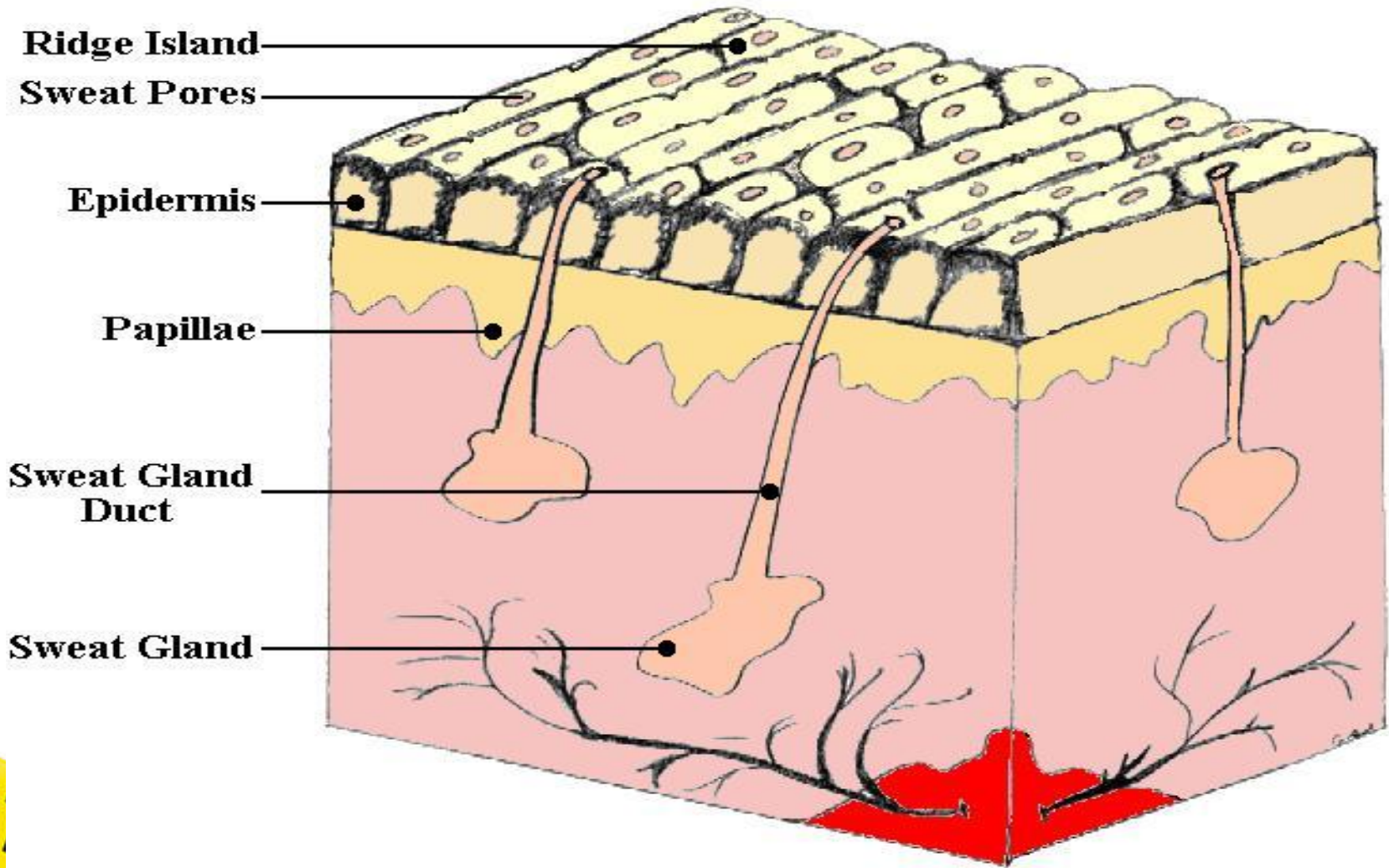


FORMATION OF FINGERPRINTS

- 
- A collection of crime scene related graphics on the left side of the slide, including a black starburst, several red blood splatters of various sizes, a grey fingerprint, and a yellow evidence marker with the number "1" on it.
- Your skin consists of an inner dermis and an outer epidermis.
 - **Where:** The creation of fingerprints occurs in the **basal layer** in the epidermis where new skin cells are produced.
 - **When:** Fingerprints probably begin forming at the start of the 10th week of pregnancy.
 - **How:** Because the basal layer grows faster than the others, it collapses, forming intricate shapes.

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Cross-Section of Skin



PRINCIPLES OF FINGERPRINTS

A collection of crime scene-related icons on the left side of the slide, including a black starburst, red blood splatters, a grey fingerprint, and a yellow evidence marker with the number "1".

According to criminal investigators, fingerprints follow 3 fundamental principles:

First Principle:

- A fingerprint is an **individual characteristic**; no two fingers have yet been found to possess the **exact** same fingerprint pattern.

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PRINCIPLES OF FINGERPRINTS

Second Principle:

- A fingerprint will remain **unchanged** for the life of an individual.

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PRINCIPLES OF FINGERPRINTS

Third Principle:

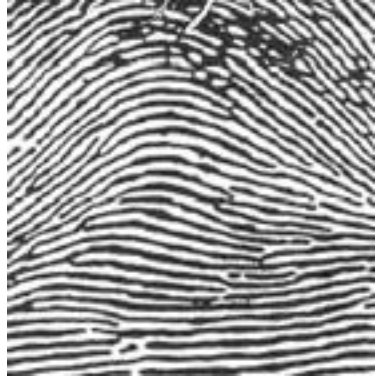
- Fingerprints have general characteristic **ridge** patterns that allow them to be systematically identified.

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CHARACTERISTICS OF FINGERPRINTS

There are 3 specific classes for all fingerprints based upon their visual **pattern**:

arches, loops, and whorls.



ARCH
About 5%

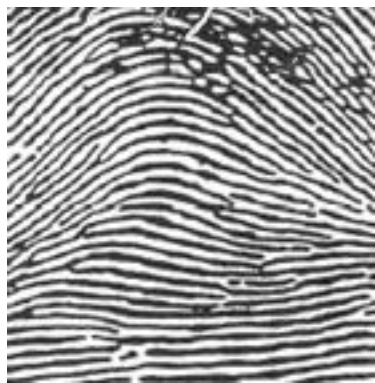
WHORL
About 30%

LOOP
About 65%

... of the population ...



CHARACTERISTICS OF FINGERPRINTS



Arch
Plain arch
Tented arch



Whorl
Plain whorl
Central pocket whorl
Double loop whorl
Accidental

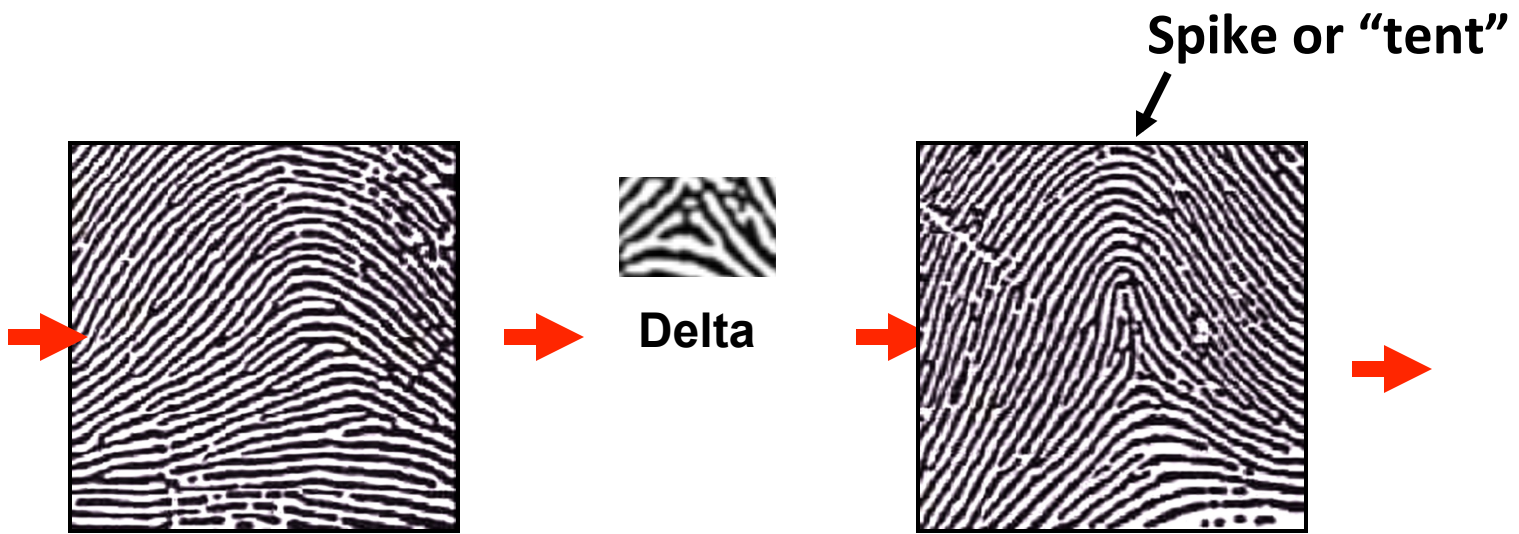


Loop
Radial Loop
Ulnar loop



ARCH

- Arches are the simplest type of fingerprints that are formed by ridges that enter on one **side** of the print and exit on the **other**. No **deltas** are present.



Plain Arch

Ridges enter on one side and exit on the other side.

Tented Arches

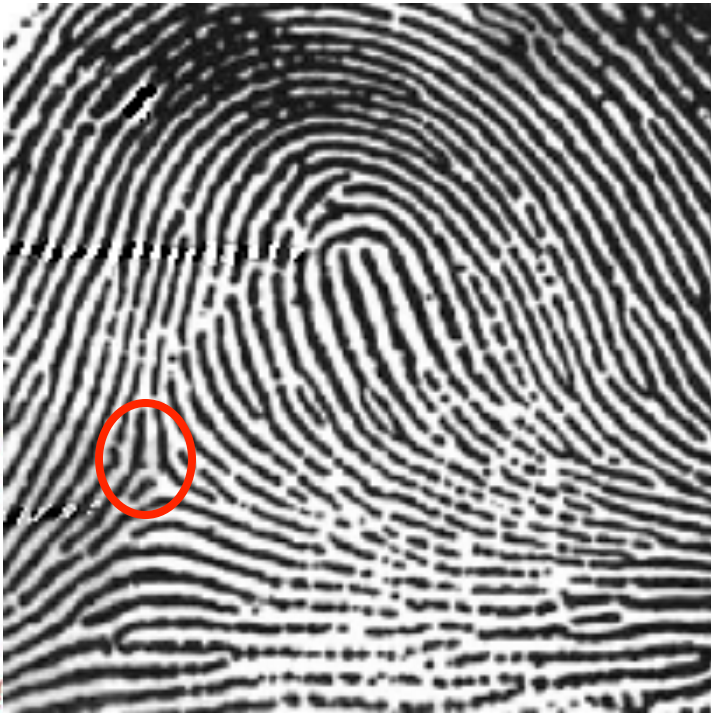
Similar to the plain arch, but has a spike in the center.



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LOOP

Loops must have one **delta** and one or more **ridges** that enter and leave on the same side.



Delta



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LOOP

Types of Loops

- **Radial**—opens toward the thumb
- **Ulnar**—opens toward the “pinky” (little finger)



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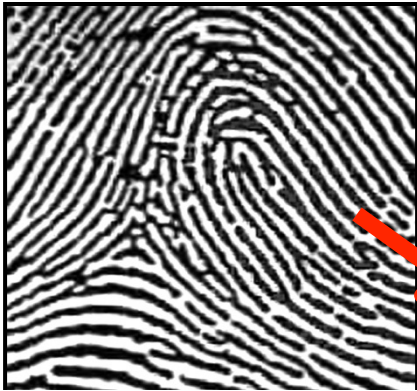
LOOP

These patterns are named for their positions related to the **radius** and **ulna** bones, i.e. the bone the loop opening is facing towards.

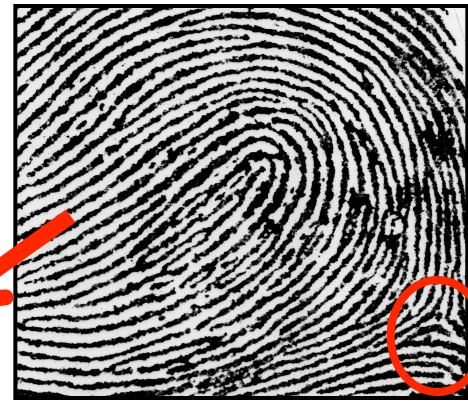


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LOOP



Ulnar Loop (Right hand)
Loop opens toward
right or the ulna bone.



Radial Loop (Right hand)
Loop opens toward the
left or the radial bone.



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WHORL

Whorls have at least one **ridge** that makes (or tends to make) a complete **circuit**. They also have at least **two** deltas. If a print has more than two deltas, it is most likely an **accidental**.



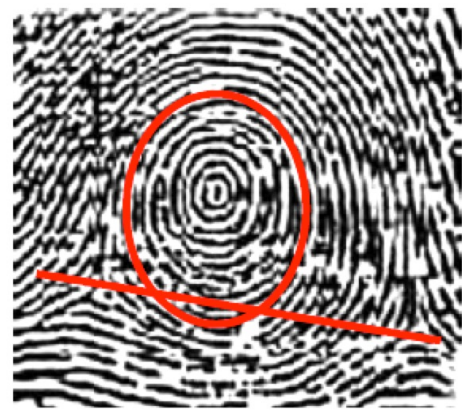
WHORL

- Whorls have at least two deltas and a core.
- A **double loop** is made of two loops.
- An **accidental** is a pattern not covered by other categories.
- **Types**
 - Plain,
 - Central Pocket,
 - Double Loop,
 - Accidental

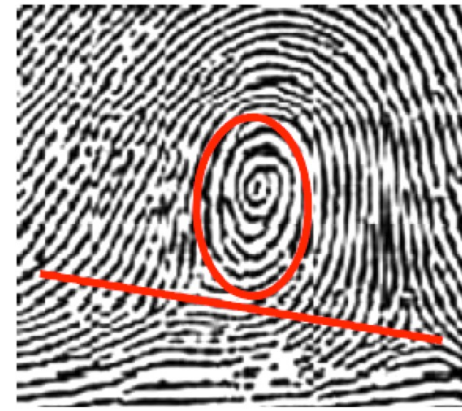


WHORL

Plain Whorl



Central Pocket Whorl

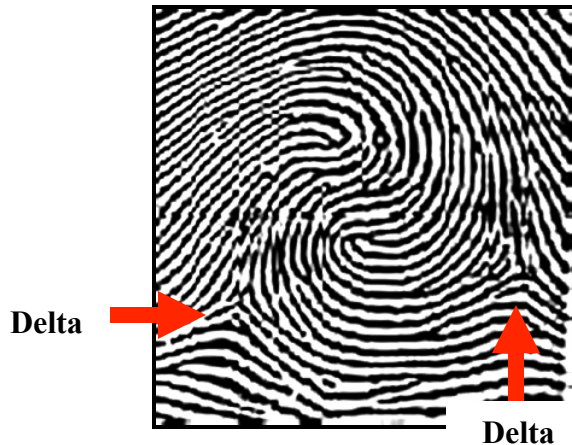


Draw a line between the two deltas in the plain and central pocket whorls. If some of the curved ridges touch the line, it is a plain whorl. If none of the center core touches the line, it is a central pocket whorl.



WHORL

Double Loop Whorl



Double loop whorls are made up of any two loops combined into one print.

Accidental Whorl



Accidental whorls contain two or more patterns (not including the plain arch), or does not clearly fall under any of the other categories.

